



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
17.12.2003 Bulletin 2003/51

(51) Int Cl.7: **H04N 1/405**

(43) Date of publication A2:
03.11.1999 Bulletin 1999/44

(21) Application number: **98121516.3**

(22) Date of filing: **13.11.1998**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **Norton, Kirkpatrick W.**
San Diego, California 92128 (US)

(74) Representative: **Schoppe, Fritz, Dipl.-Ing.**
Schoppe, Zimmermann, Stöckeler & Zinkler
Patentanwälte
Postfach 246
82043 Pullach bei München (DE)

(30) Priority: **30.04.1998 US 70552**

(71) Applicant: **Hewlett-Packard Company,**
A Delaware Corporation
Palo Alto, CA 94304 (US)

(54) **Printer with progressive column error diffusion system and method of using the same for improved printer throughput**

(57) Error diffusion apparatus (10) processes and stores image data on a sub-column basis for pixels below and to the left of a current pixel along a common diagonal. Error data is diffused on a pixel by pixel basis relative to a next pixel right of the current pixel until the

left most sub-column of pixels has a height corresponding to the height of the total number of nozzles in a single column of an inkjet print head (16). In this manner, error diffusion is accomplished on the fly with buffer memory storage capacity being substantially reduced relative to other error diffusion processes.

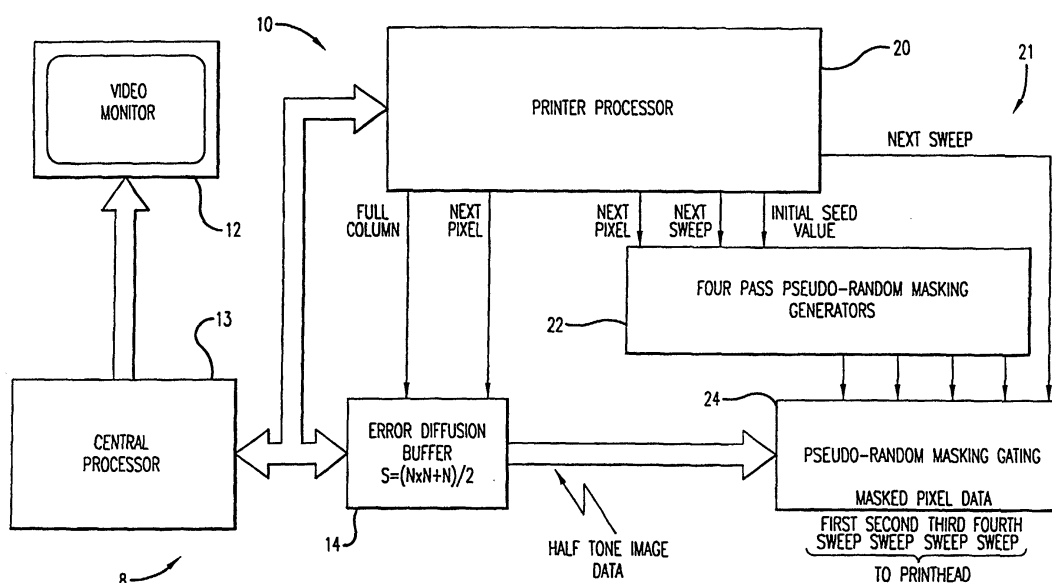


FIG.2



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 12 1516

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US 5 271 070 A (T. D. TRUONG ET AL.) 14 December 1993 (1993-12-14) * abstract *	1,4,5,7	H04N1/405
A	EP 0 295 105 A (CANON K. K.) 14 December 1988 (1988-12-14) * column 17, line 53 - column 19, line 4 * * column 22, line 8 - column 23, line 47 *	1,4,5,7	
A	EP 0 395 404 A (CANON K. K.) 31 October 1990 (1990-10-31) * page 6, line 15 - line 23 * * page 9, line 30 - line 53 *	1,4,5,7	
A	EP 0 450 853 A (CANON K. K.) 9 October 1991 (1991-10-09)		
A	EP 0 606 988 A (CANON K. K.) 20 July 1994 (1994-07-20)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			H04N
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 October 2003	Examiner De Roeck, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 12 1516

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-10-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5271070	A	14-12-1993	NONE	

EP 295105	A	14-12-1988	JP 2547771 B2	23-10-1996
			JP 63309455 A	16-12-1988
			JP 63309456 A	16-12-1988
			JP 63309457 A	16-12-1988
			JP 1959100 C	10-08-1995
			JP 6091606 B	14-11-1994
			JP 63310269 A	19-12-1988
			JP 63310270 A	19-12-1988
			JP 1927478 C	25-04-1995
			JP 6048850 B	22-06-1994
			JP 63309458 A	16-12-1988
			JP 1959101 C	10-08-1995
			JP 6091607 B	14-11-1994
			JP 63310271 A	19-12-1988
			DE 3852673 D1	16-02-1995
			DE 3852673 T2	17-08-1995
			EP 0295105 A2	14-12-1988
			US 4958236 A	18-09-1990

EP 395404	A	31-10-1990	JP 2285770 A	26-11-1990
			JP 2755309 B2	20-05-1998
			JP 2848566 B2	20-01-1999
			JP 3109871 A	09-05-1991
			DE 69033372 D1	05-01-2000
			DE 69033372 T2	11-05-2000
			EP 0395404 A2	31-10-1990
			US 5121447 A	09-06-1992

EP 450853	A	09-10-1991	JP 3005016 B2	31-01-2000
			JP 3277070 A	09-12-1991
			JP 3277071 A	09-12-1991
			JP 2974362 B2	10-11-1999
			JP 3277074 A	09-12-1991
			DE 69129818 D1	27-08-1998
			DE 69129818 T2	10-12-1998
			EP 0450853 A2	09-10-1991
			ES 2118075 T3	16-09-1998
			US 5561536 A	01-10-1996
			US 5761394 A	02-06-1998

EP 606988	A	20-07-1994	AU 674552 B2	02-01-1997
			AU 5311694 A	14-07-1994
			DE 69428061 D1	04-10-2001
			DE 69428061 T2	21-03-2002

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 12 1516

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-10-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 606988	A	EP 0606988 A2	20-07-1994
		JP 3406934 B2	19-05-2003
		JP 7020839 A	24-01-1995
		US 5553165 A	03-09-1996

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82